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Transition and Impact Analysis of Green Economy in Asia

By Hubertus Väh

Fellow of Asian Financial Cooperation Association Think Tankers
Committee, Managing Director of Frankfurt Main Finance e.V.

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Abstract: Net zero has become a global target. The implementation of this goal, however, is faced with conflicting developments in Asia as well in the rest of the world. On the one hand, due to subdued growth, durable inflation rates with the exception of China, and higher interest rates government's room for maneuvers has become more limited. On the other hand, global warming, natural disasters, and even worse conditions for future government borrowing have made the issue more urgent. Reducing greenhouse gases is a global objective, with global benefits but ultimately a national task. Concrete steps towards global net zero transition hinge on the proper functioning of global supply chains. Asian countries, especially China, are leaders in many aspects of green technology, be it mining of minerals, processing of raw materials or the manufacturing of crucial final products, be it solar and wind energy or electric vehicles. In certain areas, the likelihood and magnitude of potential supply disruptions are high, as a substitute production can't be built within a short period of time. Therefore, efforts are needed to maintain global supply chains.

Extreme weather will remind many people all over the world of the summer 2023 for a long time to come. Intense tropical storms, torrential floods, apocalyptic wildfires have been reported from Asia and other continents. The global surface air temperature for July 2023 was the highest on record for any month in the dataset, going back to 1940. "July was around 1.5°C warmer than the 1850-1900 average, the limit established by the Paris Agreement".

For many people, these extremes became a wake-up call to take the threats of climate change and the obligations from the Paris Agreement more seriously. 195 parties out of 198 parties to the UNFCCC have ratified or acceded to the Agreement. Except for Iran, Lybia and Yemen. Most countries have already implemented net zero or neutrality targets ranging from 2050 to 2070, laid down either in law or in a policy document.

Table 1: Net Zero Scorecard 2023 for selected countries

Country	Target	Year	Implementation
Bangladesh	Net zero	2050	Proposed/in discussion
China	Carbon neutrality	2060	In policy document
India	Net zero	2070	In policy document
Indonesia	Net zero	2060	Proposed/in discussion
Japan	Net zero	2050	In law
Malaysia	Net zero	2050	In policy document
Pakistan	Emissions reduction	2030	In policy document

	target		
Philippines	Reduction vs. business-as-usual scenario	2030	In policy document
Saudi Arabia	Net zero	2060	In policy document
South Korea	Net zero	2050	In law
Thailand	Net zero	2065	In policy document
United Arab Emirates	Net zero	2050	In policy document
Vietnam	Net zero	2050	In policy document
For comparison			
European Union (EU)	Climate neutral	2050	In law
United States of America	Net zero	2050	In law

Source: Energy & Climate Intelligence Unit, Net Zero Scorecard.

Since climate change is an overarching issue affecting all of humanity, one might think it is beyond the sphere of economic and political issues. But climate change is nevertheless subject to geopolitical tensions, but even more on different beliefs and perceptions about the importance of climate change.

At the Paris Summit on a New Global Financing Pact in June 2023, global leaders again underpinned the need for a “green transition that leaves no one behind”. They self critically considered the summit “a decisive political moment to recover development gains lost in recent years and to accelerate progress towards the Sustainable Development Goals.”

I. Widening perspective to natural disaster and climate risk

When a conversation turns to natural disasters, human suffering, and the number of dead and wounded should always be in the foreground. But these disasters must, in addition, be viewed in terms of assets destroyed. So far, businesses and investors have paid less attention to these physical effects of climate change and more to the costs and risks of decarbonizing.

Munich Re, the global reinsurance company with a history of five decades of research into natural disasters, confirmed for the first half of 2023 “a continuation of the recent run of years with high losses”. In 2022, severe monsoonal flood affected much of Pakistan, which suffered – in line with Afghanistan – from a deadly earthquake, too. China experienced drought and a record number of heatwave days. In May 2023, Cyclone Mocha wreaked havoc in Bangladesh, India, and Myanmar, while in June, heavy rains caused severe flooding in China.

In the 10 years from 2013 to 2022, the economic damage caused by such events increased from 162 bn U.S. dollars to 270 bn U.S. dollars worldwide. In 2013 only a quarter of these losses were covered by an insurance and even today the figures are still with only 44 pct. However, in emerging and developing countries the situation has been dramatic: the insured portion is still low, and in many cases, it is virtually zero.

According to annual Munich Re data economic losses in the Asian Pacific area have ranged from 50 to 77 bn U.S. dollars between 2019 and 2022. Percentage wise these amounts counted for a quarter of global losses. However, the insurance gap is huge, as only 15 pct have been covered by insurances. Therefore, efforts would be worth to reduce this gap in a coordinated global effort.

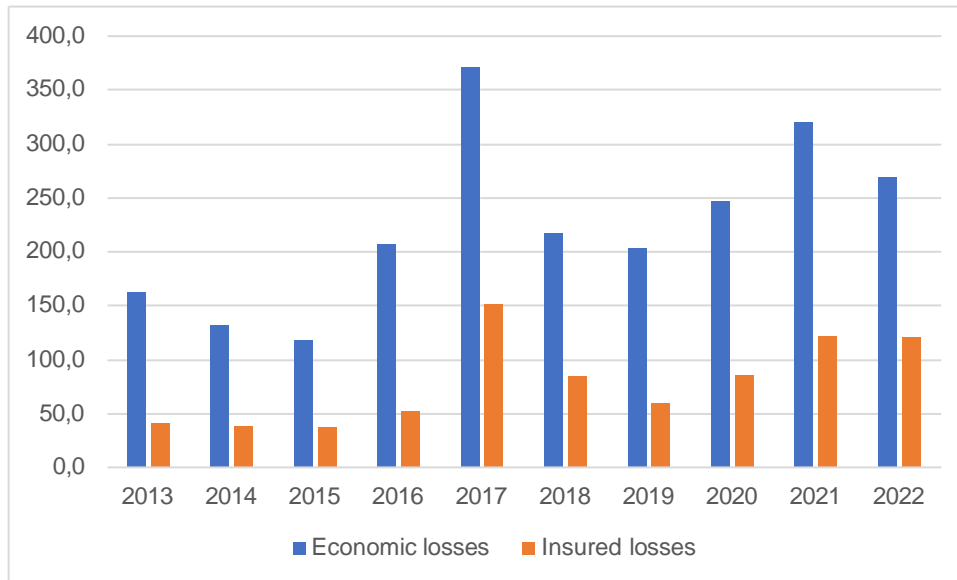


Exhibit 1: Global losses from natural disasters 2013-2022

US dollar bn, inflation-adjusted.

Source: MunichRe NatCatService, Natural disaster risks.

In addition, a recent study has shown, that under various warming scenarios, climate change could induce sovereign downgrades – expressed in rating notches – as early as 2030, with larger downgrades across more countries to 2100. In the absence of climate policy (so called RCP 8.5) 59 out of 109 sovereigns in the study will experience downgrades of approximately 0.68 notches by 2030, rising to 81 sovereigns facing a downgrade of 2.18 notches by 2100. In this case, Malaysia and India are among the most affected countries globally, all exceeding five-notch downgrades.

Stringent climate policy (so called RCP 2.6) will result in minimal changes to the current ratings profile. The additional cost to sovereign debt, expressed as increases in annual interest rate payments due to the downgrades, is 45 to 67 bn U.S. dollars under RCP 2.6 and 135 to 203 bn U.S. dollars under RCP 8.5. Corporate issuers will be affected accordingly.

Table 2: Global climate-induced sovereign rating changes for selected countries

Country	Initial Rating Notch	2030		2100	
		RCP 2.6	RCP 8.5	RCP 2.6	RCP 8.5
Bangladesh	8.000	0.08	0.13	0.58	1.41
China	16.333	1.34	1.86	1.80	6.53
India	11.000	1.22	1.84	3.73	5.55
Indonesia	11.000	1.63	2.09	3.38	4.06
Japan	16.000	0.25	0.35	1.42	2.56
Malaysia	14.000	0.99	1.33	0.85	6.07
Pakistan	5.500	-0.15	-0.12	-0.16	0.24
Philippines	12.333	1.14	1.64	3.60	3.76
Qatar	17.333	0.13	0.19	0.07	0.66
Saudi Arabia	14.333	-0.03	-0.03	-0.03	0.31
South Korea	17.833	0.33	0.42	1.80	2.57
Thailand	13.000	0.66	0.68	0.67	2.28
Vietnam	8.333	0.02	0.08	0.04	2.25
For comparison					
Germany	20.000	0.47	0.53	0.48	0.78
United States	19.000	0.49	0.76	1.25	4.68
Average		0.57	0.68	0.94	2.18

Climate-induced sovereign downgrades (upgrade = -) by 2030 and 2100 under the RCP 2.6 and RCP 8.5 models. Change in rating notches.

Source: Patrycja Klusak, Matthew Agarwala, Matt Burke, Moritz Kraemer, Kamiar Mohaddes, *Rising Temperatures, Falling Ratings: The Effect of Climate Change on Sovereign Creditworthiness*. *Management Science*, 7 August 2023.

II. Resilience and diversification of global supply chains

The preceding is based on the consideration of mutual dependencies among countries. Much of the wealth creation over the last decades was driven by the growing importance of global trade and supply chains. Technological progress, cost efficiency, the expansion of multinational corporations, the liberalization of trade as well as the contribution to the national development of emerging markets have been the reasons behind that expansion and interconnectedness.

Global trade and supply chains have grown in complexity and wide-ranging trade deals have mostly stalled. Typically, more than one country is involved in the global value chain. Countries and regions tend to have different weights in the various steps of supply, or even broader value chains, being focused on raw materials/commodities, manufacturing capabilities, knowledge-intensive activities such as product design and innovation, or even logistics.

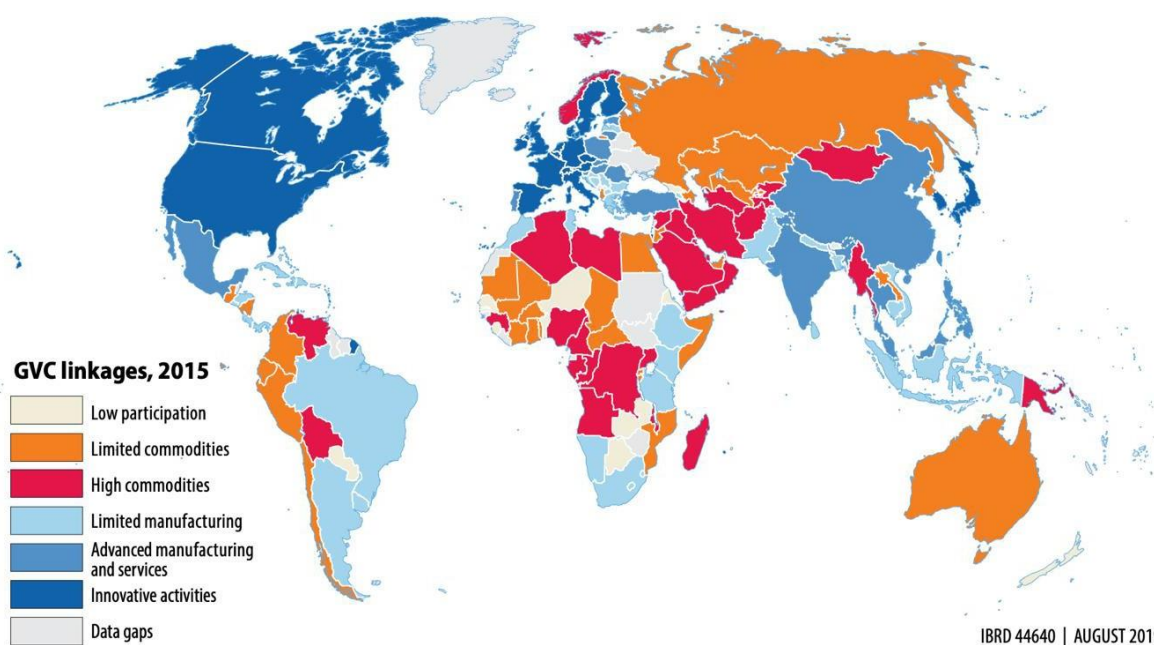


Exhibit 2: All countries participate in the global value chains – but not in the same way

The type of a country's global value chain (GVC) linkages is based on (1) the extent of its GVC participation, (2) the country's sectoral specialization in trade, and (3) measures of innovation. Data based on the GVC taxonomy for 2015.

Source: World Bank, World Development Report 2020. Trading for Development in the Age of Global Value Chains. Overview, p. 2.

All economies share concentrated trade relationships. Analysis of 128 economies reveal that every economy sources at least 20 pct of the imports from no more than three countries and at least 5 pct from no more than two countries. However, there is significant country-by-country variation. Economies in Europe and Asia Pacific tend to have the most diversified trade relationships.

OECD data indicate for example the relatively high degree of integration of ASEAN members in global value chains in international comparison. In ASEAN countries, the average import content of local production (backward participation) equals 27 pct and the share of value added that was exported to be used in the production abroad (forward participation) equals 25 pct on average. In contrast, the relevant participation rates among large Latin-American economies vary between 4 and 11 pct.

Extensive participation in global trade and supply chains is not inherently problematic. However, a disruption in one part of the global supply chain can have ripple effects across every link.

A recent study presented at an IMF conference on geoeconomics fragmentation have shown the effects of tariffs on trade enacted by the US in 2017. Over the period, China's share of U.S. imports fell from 22 pct to 16 pct while Vietnam (1.99 pp), Canada (0.75 pp), Mexico (0.64 pp), India (0.57 pp) and South Korea (0.53 pp) gained market share. China is primarily being replaced by individual exporters that are large, developing countries with revealed comparative advantage in a product, and that are intricately linked to China's supply chain.

Not only the private sector is concerned with the negative impacts of global supply chain disruptions. In general, supply chains are vulnerable to everything from acute climate change events, trade disputes or cyberattacks. And shocks to these chains are becoming more frequent and severe, as experts predict. Persisting interruptions have the potential to threaten national economic stability through, e.g., loss of income, inflationary pressure, or shifts in trade balance.

Consequently, there is a widespread discussion regarding decoupling. "A full reshuffling of global supply chains is not only a long-term process, it is also one that would require to be supported by pronounced and prolonged government intervention. Moreover, decoupling in direct trade may only serve to obscure the indirect linkages through the industrial supply chains of their trade partners."

Some governments are starting to recognize the risks associated with global supply chains in initial strategies and policies aimed at individual sectors or technologies. Their implicit focus lies mainly on import from Asia.

The EU Commission presented its (1) EU Industrial Strategy in March 2020 to support the twin transition to a green and digital economy; its (2) Repower EU Plan in May 2022 to respond to the energy crisis induced by the Russian invasion of Ukraine, and (3) the Green Deal Industrial Plan for the Net-Zero Age in February 2023 to enhance the competitiveness of Europe's net-zero industry and support a fast transition to climate neutrality.

Japan enacted the Economic Security Promotion Act in May 2022, which also aims to secure supply chains from disruption due to geopolitical conflict. The U.S. passed the Infrastructure Investment and Jobs Act in November 2021 and the Inflation Reduction Act in August 2022, which seek to improve U.S. economic competitiveness, innovation, and industrial productivity – including a significant shift to climate-related investments. South Korea adopted its Materials, Parts, Equipment 2.0 Strategy in July 2020 to proactively address the restructuring of the global supply chain, alongside an array of measures aimed at fostering the domestic production of strategic technologies.

III. Net zero transition hinges on the proper functioning of global supply chains

Recent real-world events have explicitly highlighted how interruptions in concentrated global supply chains can also undermine national net zero efforts. They signify the importance of addressing global supply chain concentrations with net zero technologies. A prime example of this is Germany's challenged energy security in the wake of the Russian invasion of Ukraine.

Most critical for the swift progress and the success of the transformation is the free flow of raw material and goods as many of the underlying technologies are produced in global supply chains, sometimes involving high levels of supply concentration in certain countries or even local hubs. In

addition to the mere availability of raw material and technologies in the necessary quantity also cost implications need to be taken into account.

The International Energy Agency (IEA) analyzed, on a global scale, three key net zero technologies – solar photovoltaics, batteries for electric vehicles and low-emissions hydrogen – with respect to their risk of disruptions in global supply chains. This analysis found that, in fact, all three technologies are at high risk regarding at least one of their components or underlying raw materials.

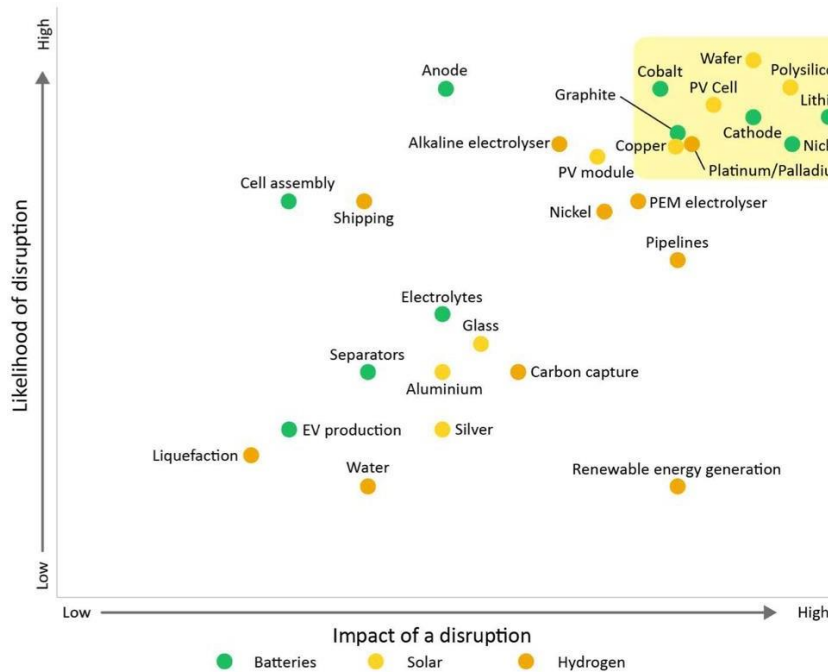


Exhibit 3: Likelihood and magnitude of the impact of potential supply disruptions for leading clean energy inputs

Source: International Energy Agency, *Securing Clean Energy Technology Supply Chains*, July 2022, p. 18.

IV. Net zero manufacturing capacities are concentrated in Asia

Important net zero technologies are concentrated especially in China and some other Asian countries. The deposits of minerals, especially rare earths, are limited both at company and geographical/jurisdictional level.

The processing of the minerals shows an even significantly higher degree of concentration than the mining, as shown in the exhibit for the three most important mining and processing countries. In the case of lithium, graphite and rare earths mining is concentrated between 80 and 90 pct on three countries, but the processing of these minerals is basically done by almost 100 pct in only three countries. Market shares in these areas are heavily dominated by China. Other major players are Indonesia, Chile, and Australia.

In addition, also green manufacturing of businesses like batteries for electric vehicles and solar photovoltaics are concentrated in Asia. Only in the wind turbine industry, two European and one North American company were among the top four in 2022.

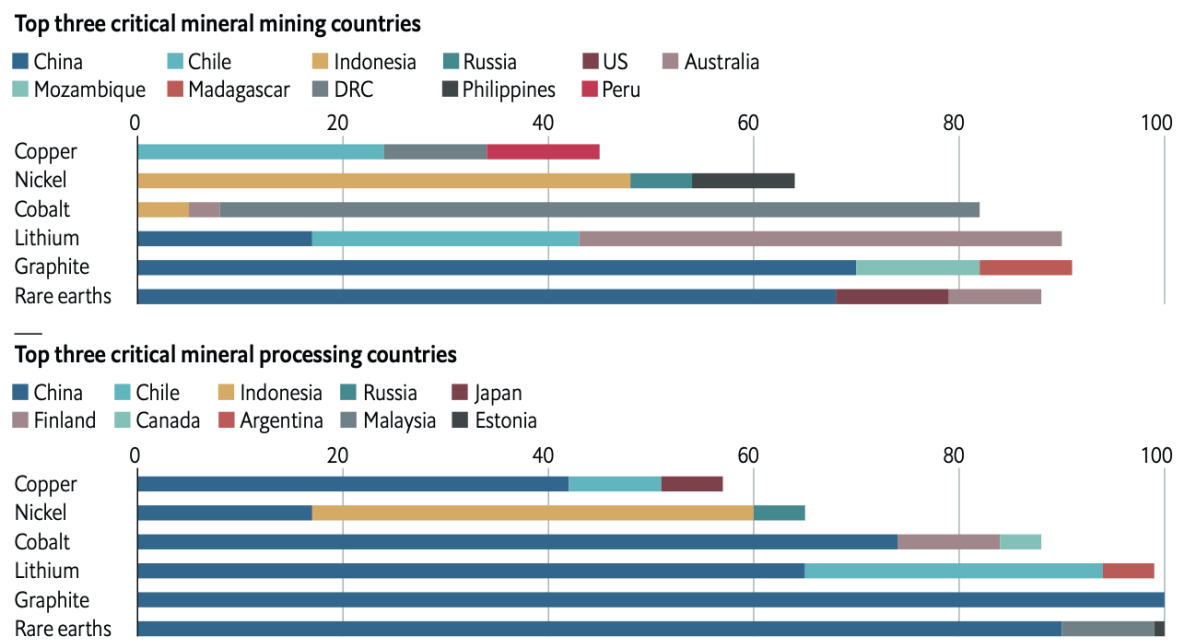


Exhibit 4: Critical minerals supply chains by top three countries

In pct of global output 2022.

Source: The Economist Intelligence Unit, The global green subsidy race. How is it reshaping climate policy and geopolitics? July 2023.

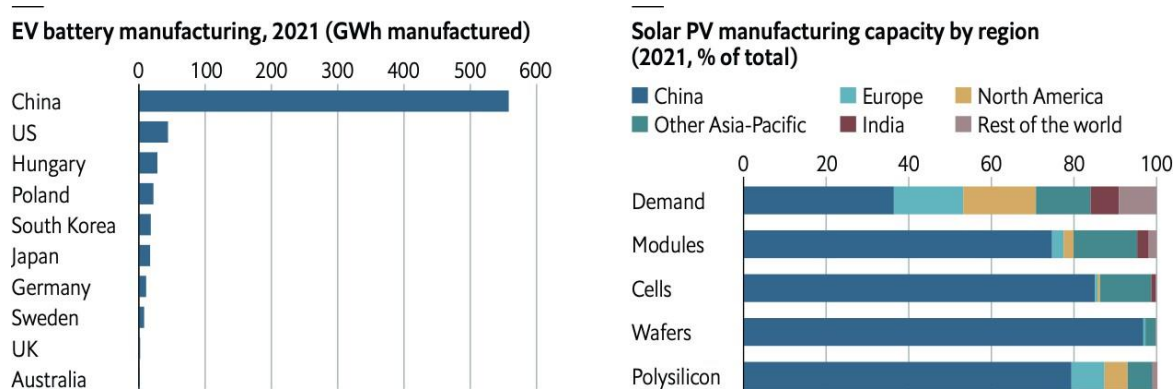


Exhibit 5: Green manufacturing by countries and regions

Source: The Economist Intelligence Unit, The global green subsidy race. How is it reshaping climate policy and geopolitics? July 2023.

Countries like Germany and Japan rely on respective imports. Solar panels and batteries might serve an examples of key net zero technologies with limited domestic production. Imports from China, for example, account for approximately 60 pct of Germany’s direct imports of solar panels. Another 8 pct are indirectly related to China, via other immediate import partners such as Malaysia. Japan’s imports of solar panels are equally concentrated in sourcing from China, with a direct and indirect import share of roughly 69 pct.

Across each of the respective downstream steps of the battery supply chain Chinese imports account

for 30 to 40 pct of Germany's import. An additional 15 pct relates to indirect preceding imports from China. For Japan, the direct import concentration and indirect reliance for batteries and cell components is even higher, although it should be noted that Japan's domestic production capacities in the battery industry are not reflected in these data.

Insofar, it could not be in the long-term interest of Asian countries stop supplying the rest of the world as this could slow down the transition to net zero in these global regions.

V. Reducing fossil fuel consumption by green technologies

Asia currently remains dependent on fossil fuels, particularly coal. Overall, global energy-related CO2 emissions grew by 0.9 pct in 2022, reaching a new high of over 36.8 Gt. However, the data could not be interpreted as stable long-term trends, because they reflect the short-term effects of the COVID 19 pandemic and the war over Ukraine. At least, a strong expansion of renewables limited the rebound in coal power emissions. Renewables met 90 pct the global growth in electricity generation in 2022.

Since 2010, electricity generation in Asia surged by 78 pct from 8,122 Terawatt hours to 14,455 Terawatt hours in 2022. The shift from fossil fuel to renewable energy is significant. In 2010, renewable energy (wind, solar and bioenergy) counted for only 2 pct of the electricity generation, in 2022 for 13 pct. During the same period, fossil fuels declined by 5 pp from 77 pct to 72 pct with coal accounting for the lion's share of 59 and 56 pct, respectively.

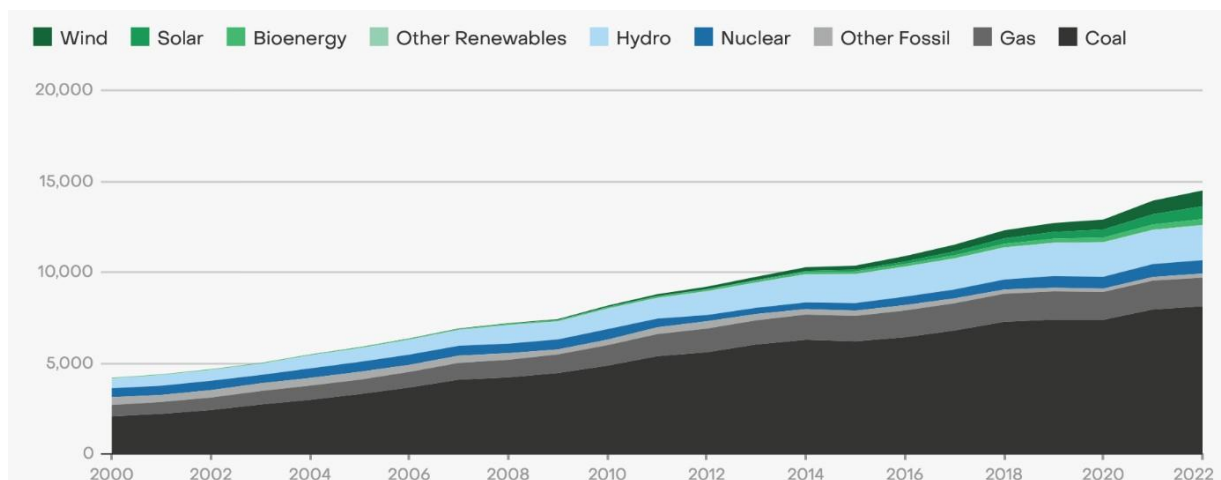


Exhibit 6: Asia electricity generation by source from 2000 to 2022

Terawatt hours

Source: Ember Electricity Data Explorer, ember-climate.org

In Asia 69 pct of the electricity generation comes from fossil fuels. Most leading countries in Asia report an even higher share in fossil fuels. Vietnam faces the most positive situation, as only half of the production is based on fossils, while 37 pct come from hydro and 13 pct from solar and wind.

The most effective way to reduce CO2 emissions is to reduce fossil fuel consumption. Due to its production dominance in these field, the development regarding electric vehicles might serve as an example of opportunities and future potential of Asia.

During just five years, from 2017 to 2022, sales globally jumped from around 1 mn to more than 10 mn. Three markets – China, Europe, and the United States – account for about 80 pct of the growth in sales. In 2022, China accounted for nearly 60 pct of all new electric car registrations globally. For the first time in 2022, China accounted for more than 50 pct of all electric cars on the world's roads, a total of 13.8 million. The share of electric cars in total domestic car sales reached 29 pct in China, up from 16 pct in 2021 and under 6 pct between 2018 and 2020.

In the rest of Asia, the market is just taking off. In South Korea sales exceeded the threshold of 100,000 vehicles, while in Japan sales was at about this number. Emerging market and developing economies account for only a fraction of the electric car market. Sales remain low. In India sales reached nearly 50,000 in 2022, 4 times more than in 2021. The Indian market, however, remains geared towards shared and smaller mobility. In Thailand, electric car sales doubled to 21,000. In Indonesia, sales multiplied by more than 14, exceeding 10,000.

China, Japan, and South Korea are well fit to implement new green technologies that are needed in later stages of decarbonization such as green hydrogen, green steel, carbon capture, advanced geothermal and advanced nuclear power.

Expert Biography:

Hubertus Vaeth is a Fellow of Asian Financial Cooperation Association Think Tankers Committee, a board member of the World Alliance of International Financial Centres (WAIFC), Managing Director of Frankfurt Main Finance e.V., the financial centre initiative of the leading financial centre in Germany and the euro zone. He is trained as Economist and was, in his prior role, Chief Economist Asia Pacific at Deutsche Bank, based in Singapore.

About AFTTC:

Asian Financial Cooperation Association (AFCA) was founded in May 2017. It is the first international financial social organization initiated by China. Asian Financial Cooperation Association Think Tankers Committee (AFTTC) is composed of over a hundred domestic and foreign experts from more than forty countries and regions. With the philosophy of "market location, global perspective, problem orientation, in-depth observation, and smart solution", AFTTC has developed AFCA working paper, Asian Financial Observation, Financial Development Report for the Guangdong-Hong Kong-Macao Greater Bay Area, and other bilingual products, conducted Quarterly Seminars, Annual Forums and other high-level financial activities, sending a strong Asian message constantly on the international stage.

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Liu Liyang | Research Department

Asian Financial Cooperation Association

Site: <http://afca-asia.org> | **Address:** 23F, Building No.5, Yard 1, Yuetan South Street, Xicheng District, Beijing
| **Zip:**100045

Mobile: +86 185 6952 8578 | **Email:** liuliyang@afca-asia.org

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